

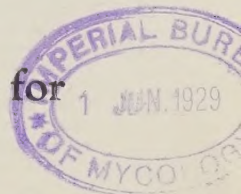
IOWA STATE COLLEGE OF AGRICULTURE
AND MECHANIC ARTS

EXTENSION SERVICE

R. K. Bliss, Director

The Hot Formaldehyde Dip for Seed Potatoes

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The greatest limiting factors in the production of a potato crop in Iowa are not soil and climatic conditions, as is generally supposed, but diseased seed. Diseases not only reduce the yield by killing and stunting the potato vines in the field, but in many cases render the potatoes unsalable due to black scurf, scab, rots and other diseases. A large part of the loss annually suffered by growers can be avoided by the use of healthy seed. This can be secured only by careful selection and seed treatment.

This circular describes briefly the most important diseases which attack the vines and tubers of the potato plant that yield to seed treatment.

BLACK SCURF

Black scurf (figs. 2 and 3) is a fungous disease more commonly observed on the tubers, but does its chief damage to the vines. It infects the stem from the seed piece or from the soil, producing a white felt-like growth on the surface. It often causes the roots to rot off, girdles the stem and produces stunted plants, with compact tops, vertical



Fig. 1. The stock tank used for treating seed potatoes with hot formaldehyde. Note the trench under the tank and the stove pipe at the opposite end. A very convenient outfit for the average Iowa farm.

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branches and stunted, curly leaves. In some cases tubers are produced above ground. On the tubers, the fungus develops small black specks known as sclerotia, which are sometimes difficult to distinguish from soil particles. Washing is a good test, as the sclerotia do not wash off readily.

The scurf fungus flourishes best in a poorly drained, acid soil; hence good drainage is a primary requisite for potato land. It is not advisable to apply too much lime to potato ground, because the scab fungus thrives best in a sweet soil.

Control: The only satisfactory control measures are seed treatment and crop rotation. The fungus is carried thru the winter on the seed, as well as in the soil; hence, careful seed treatment will greatly reduce that source of infection.

COMMON SCAB

Potato scab (fig. 4) is the most common tuber disease in Iowa, reducing the yield and causing a poor grade of product. It is prevalent both on seed stocks and in the soil.

The symptoms of scab are well known. The disease produces scabby spots, irregular in size and outline, on the surface of the tuber. In some cases the spots are deep in the flesh, causing brown, discolored areas. **Control:** Heavy applications of lime or of barnyard manure greatly aid the scab organism in its development. Well rotted manure can be applied safely before plowing or as a top dressing. The use of healthy treated seed is the most effective means of controlling this disease.

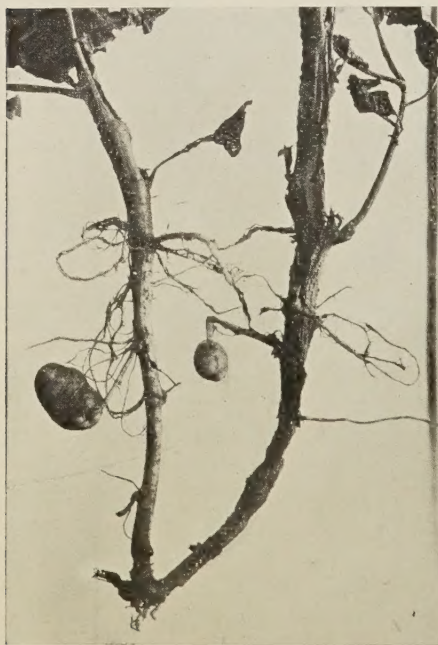


Fig. 2. Here the black scurf fungus has destroyed the outside tissues of the stem on the right, while the one at the left has escaped without much injury. Notice the stolon bearing the tuber has rotted off.

BLACK LEG

Black leg (fig. 5) is a bacterial disease that lives from one season to the next in the tuber. From infected seed the germs travel from the seed piece into the stem, causing the tissues to rot and turn black. Soon after infection the leaves begin to lose their dark green color, taking on a rolled, yellowish-green appearance, and later turn brown and dry up.

Black leg is especially common during warm, wet weather and occurs most frequently in June and July. It may appear at any time until frost, if weather conditions are favorable. It is more common on early Ohios and Irish Cobblers than on

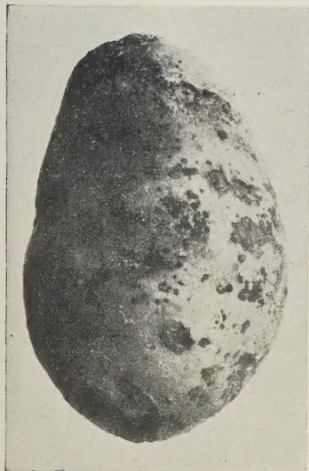


Fig. 3. Black scurf is evident as black dirt-like particles adhering to the tuber. These are masses of fungus threads (sclerotia) which enable the parasite to live over winter and attack the roots and stems again in the spring. Seed treatment kills them.

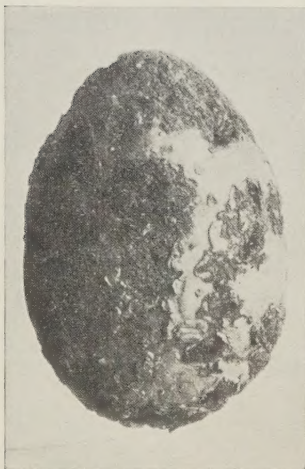


Fig. 4. Common scab is very conspicuous on the tuber. The scab spots are favorable places for wire worms and insects to feed. Under such conditions the spots become very deep. The disease can be controlled by seed treatment.

the late sorts. It may affect as high as 12 percent of the plants.

Black leg attacks the tubers as well as the vines, entering thru the stem end and causing a discoloration, as shown in Fig. 5. Such tubers carry the disease over from one year to another. Seed from the northern part of the United States very frequently is infected.

Control: Since black leg is carried mostly in or on the seed, the seed treatment described later, coupled with field selection, is the most efficient means of control. All tubers with rotten spots or black streaks at the stem end should be discarded. It is also advisable to set aside a certain number of rows as a seed plot. All infected plants should be pulled or rogued out.

TUBER ROTS

Under this heading are grouped those rots which affect the tubers in the field, as well as in storage. In most cases the field rots come either from seed infected the previous year or from the soil, and continue to develop in storage. Other rots develop only in storage, following bruising or improper storage conditions, such as high temperature and poor ventilation. Selection, careful handling and good storage, coupled with seed treatment, reduces such losses to a minimum.

SEED TREATMENT

Inasmuch as diseased seed may produce a diseased crop, the best seed available should be secured for planting. In addition, all seed should be treated. The diseases described herein previously can be partially or wholly controlled by proper seed treatment. Several different methods of seed treatment are known, but the new method known as the Hot Formaldehyde Method, worked out by the Iowa Agricultural Experiment Station, is the most practical and effective.

HOT FORMALDEHYDE DIP

Formaldehyde, also known as formalin, can be purchased at any drug store, either in bulk or pint tin containers. It does not lose strength on evaporation, whether hot or cold, nor by continued use for potato seed treatment.

A good thermometer is necessary to determine the temperature. These can usually be obtained at a hardware store at \$0.75 to \$1. The temperature is easily held at 125° F. after a little experience has been gained in regulating the amount of heat applied.

Formula:

2 pints formaldehyde in 30 gallons of water.

Heat solution to 125° F.

Dip uncut seed in crates or potato sacks 3 minutes.

Cover 1 hour.

The seed dries adequately in crates or full potato sacks.

Plant as soon after cutting as possible.

METHODS

Wash tub.

For small lots of potatoes up to 25 bushels, the treatment may be made easily in an ordinary wash tub heated on a cook stove. The solution should be made up and placed over the fire until the temperature is raised to 125° F. The sacked potatoes may then be dipped in half-bushel lots. A little regulation of the fire and the position of the tub will afford means of regulating the temperature.

Tank. (Fig. 1)

For larger lots a small stock tank may be used, the solution being heated by making a trench under it and building a wood fire. One end of the trench will require a chimney or stove pipe. A false bottom of woven wire or boards is adequate to protect the potatoes from becoming too warm on the bottom of the tank. From 200 to 300 bushels can be treated by this method per day.

Steam.

In treating still larger quantities, the work can be done effectively in a stock tank of about 300 gallons capacity. The solution may be heated with a steam coil from any steam boiler. From 500 to 1,000 bushels per day can be treated with an outfit of this description. It is especially adapted to community cooperation, either at a creamery or on some farm where a steam engine is available. Seed treatment centers make it possible for several farmers to work together in treating their seed.

There are also several commercial seed treating machines on the market, all of which give good satisfaction. Names and addresses of these firms may be secured by writing the Iowa Experiment Station, Ames, Iowa.



Fig. 5. Black leg. The signs of the disease begin at the seed piece and run up the stem, which turns inky black and gets soft. The leaves become yellowish and assume an upright position. Finally the plant falls over and dries up.